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GROWTH AND HAEMATOLOGICAL PARAMETERS OF JAPANESE QUAILS (Corturnix cortunix japonica) FED DRIED CORN SILK POLYALTHIA LONGIFOLIA LEAF MEAL MIXTURE

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ABSTRACT

A study was conducted to assess the growth and haematological parameters of japanese quails (corturnix cortunix japonica) fed dried corn silk- polyalthia longifolia leaf meal mixture. One hundred and eighty (one week) old Japanese quails were used for this study. Experimental animals which weighed between 18.03 and 18.16 grams were allotted to four dietary treatments of forty five quails per group in a completely randomized design. The basal feed was formulated to meet the nutritional requirement of quails according to NRC (1994). Four treatments groups had diets containing PLCSM at 0, 5, 10 and 15% dietary inclusion levels. Feed and water were provided ad libitum throughout the experimental period which lasted for 7 weeks The performance criteria were initial live weight, final live weight, total feed intake, feed conversion ratio, daily water intake and mortality while the blood profile includes the hematological. All the hematological parameters evaluated: Pack cell volume (PCV), Haemoglobin (Hb), White blood cell (WBC), Red blood cell (RBC), Mean corpuscular haemoglobin concentration (MCHC), Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH) were significantly($P<0.05$) affected by the inclusion of PLCSM. Significant influences were also observed for final live weight, feed intake,daily weight gain, feed conversion ratio, daily water consumption and mortality rate.
The results of this experiment demonstrated that the inclusion of PLCSM up to 15% has no deleterious effect on the performance and health status of quails.

Key words: Japanese quails, performance, heamatological parameters, phytochemicals

1. INTRODUCTION

The use of antibiotics growth promoter at sub therapeutic level (AGPs) has been practiced in the poultry industry since 1946, but recent research has proven that its continuous use can cause bacteria resistance and possible transmission of the antibiotic residues into the food chain (Kristy Kemmett., 2015; Sanjyal and Sapkota., 2011). Because of food safety concerns, there has been a recent ban in the use of antibiotics (synthetic) in livestock diets by European countries, research are now been channeled on the use of medicinal plants as alternative in animal production, because people are now informed on the dangers of the use of synthetic drugs, its toxicity, high cost and adverse effects in the human body (Adu et al., 2009).
Medicinal plants play a significant role in improving the performance, live weight and feed efficiency in animals without any adverse effect. They are also regarded as phytobiotics which

are now the object of increasing interest across livestock production as antibiotic use becomes ever-more restricted(Yang and Choct, 2009). According to Windisch and Kroismayr (2007) phytobiotics are plant derived products added to feed in order to improve the performance of livestock, they originate from leaves, roots or fruits herbs, spices and other plants. They could come in several forms such as solid, dried and powder or as extracts (essential oils).

Most phytobiotics function as antibacterial, antioxidants, anticoccidial, antiviral, anti-inflammatory and antihelmintic (Mundhe et al., 2012) thus leading to increase in general performance in animals. They are cheap, affordable effective and can improve the flavor and palatability of feed. Example of such medicinal plant are Polyalthia longifolia and corn silk.

Polyalthia longifolia is a tall evergreen tree commonly used as ornamental street tree, it possess significant biological and pharmacological activities such as antibacterial, antifungal, antitumor and antioxidant properties. Almost all parts of P.longifolia plants are used in Indian traditional system for the treatment of various ailments and the significant medicinal properties was further reported via scientific investigations (Subramanion et al, 2013). Literature report of few phytochemical screening tests on P. longifolia shows the presence of saponins, carbohydrates, alkaloids, tannins, resins, steroids, glycosides and flavonoids as major phytochemical constituents (Prateek et al, 2014). Traditionally in India, the plant has been used for the treatment of helminthiasis, skin diseases in human and livestock. The antimicrobial potency of the leaves (Annapuma, 1983), stem (Faizi et al, 2003) have been reported. Pharmacological studies on the bark of the plants shows display effective antimicrobial activity Faizi and Tauseef (2013), cytotoxic function Chang et al., (2006),hypotensive effects (Chenet al., 2006). Almost all parts of P. longifolia plants are used in Indian traditional system for the treatment of various ailments and the significant medicinal properties was further reported via scientific investigation (Faizi et al., 2003).

Corn silk scientifically regarded as Maydis stigma. It is an important herb used traditionally by the Chinese, and Native Americans to treat many diseases. It is also used as traditional medicine in many parts of the world such as Turkey, United States and France (Khairunnisa Hasanudin et al (2012). Corn silk is a set stigma hair that is soft and smooth and looks like a thread or yellowish hair (Haslina et al, 2014). According to Guo et al (2009); Liu et al (2011) and Wang (2011)corn silk contains flavonoids, saponin, phenols, anthocyanins, vanillic acid, steroids, vitamin B, vitamin C, vitamin K and minerals such as magnesium, calcium, zinc, phosphorus and antioxidants.

Pharmacological studies have revealed that corn silk performs several biological activities such as anti-bacterial (Barter, 2007; Sharma et al, 2009), anti-oxidant (El-Ghorab et al, 2007) and anti-diuretic (Reblova, 2012). Sharma et al (2011) evaluated the anti-inflammatory activity of ethanolic and aqueous extracts of P. longifolia leaf meal in albino wister rats, results revealed that both anti-inflammatory activity are comparable. Rota et al (2004) reported the antimicrobial properties of essential oil, improvement in growth parameters and carcass yield have been in broilers fed supplemented with garlic essential oil (Langhout et al .,2000). Essential oil has also been found to have antibacterial ability, and also antioxidant, anti-inflammatory, anti-carcinogenic, digestion stimulating and hypolipidemic activities (Viuda-Martos et al., 2010). Alagbe et al (2018) reported a significant ($P<0.05$) difference in final live weight of grass cutters fed diet containing 0.5% P. longifolia oil. Significant influences were observed in performance, nutrient retention and immune response of broiler chickens fed 3.5% P. longifolia leaf meal Alagbe, J. O (2017).

Several studies have reported on the impact of P.longifolia on broilers and grass cutters (Alagbe, 2017), but there is a less information on the on the mixture of dried P. longifolia leaf meal – corn silk mixture in the diet of quails. A timely evaluation of its effects as a phytogenic feed additive in quails feed will provide useful information relating to the tolerable rate and its impact on the blood profile of the bird. Therefore this study was conducted to evaluate the growth and haematological parameters of japanese quails (corturnix cortunix japonica) fed dried corn silk-polyalthia longifolia leaf meal mixture.

MATERIALS AND METHODS

Location of experiment

The experiment was carried out at Dan-malafia Farms, Ogbomosho, Nigeria. The area is located within the derived savannah zone of Nigeria. The research was conducted between January to March, 2017.

Collection and processing of test materials

Fresh healthy mature disease free Polyalthia longifolia leaves were harvested from Dan-malafia farms, Ibadan. The leaves were separated , first washed with running tap water and then with distilled water, shade dried without any contamination for 8 days and passed through a hammer mill to produce P. longifolia leaf meal (PLMM).

Fresh matured Local corn was collected from the farm premises, the corn silk was removed from them and air dried for 5 days before it was processed to dried corn silk powder (CSM). The P. longifolia leaf meal and corn silk powder were mixed together in ratio of 1:1 respectively to form Polyalthia longifolia –corn silk meal mixture (PLCSM).

Formulation of experimental diets

Four experimental diets were formulated with diet 1 which served as the control, diet 2, 3 and 4 had PLCSM inclusion at levels of 0, 5, 10 and 15% as presented in Table 1.

Animals and their management

A total of One hundred and eighty (one week) old Japanese quails were used for this study. The birds were divided into four dietary groups and each group was subdivided into three replicates of fifteen quails each. They were housed in a wooden cage with dimensions of 1 × 1 × 0.4 m (length, width, height). Wood shavings were used as litter material in the cages, artificial lighting was used to provide the birds with 24 hours light during the whole experimental period. The initial brooding temperature was 35oC in the first week and it was gradually reduced by 2oC per week to 22oC for the rest of the experiment. Vaccines were administered according to the prevailing vaccination schedule in the environment. Feed and water were provided throughout the experimental period which lasted for 7 weeks.

Parameters measured

Growth performance parameters

Daily feed intake (g) was calculated by difference between feed offered and the left over, feed conversion ratio was determined as feed intake divided by body weight gain, water consumption and mortality were recorded daily throughout the experimental period.

Blood analysis

At the 7th week of the experiment, blood samples were collected from the brachial vein of three randomly selected birds per group. The blood samples were analyzed for some hematological and serum biochemical parameters; blood samples for hematology were collected into bottles containing Ethylene Diamine Tetra Acetate (EDTA). The hematological parameters such as Pack cell volume (PCV), Red blood cell (RBC), White blood cell (WBC), Haemoglobin concentration (Hb) and absolute counts of neutrophils, lymphocytes, monocytes and eosinophils were computed according to the method of Jain (1986).

Chemical Analysis

Proximate analysis of diets and PLMM and CSM were determined according to AOAC (2000). The phytochemical screening was of PLMM determined according to procedures outlined by Harbone (1984) and Stahl (1984). The mineral analysis were carried out using Atomic Absorption Spectrophotometer (AAS).

Statistical Analysis

All data generated were subjected to a one way analysis of variance (ANOVA) and treatment means were compared using Duncan's multiple range test as outlined by Steel and Torrie (1990) using SAS (1997) package.

Table 1. Percentage Composition of the Experimental Diets

Ingredients Diets

	1	2	3	4
Maize	46.0	46.0	46.0	46.0
Wheat offal	16.25	16.25	16.25	16.25
Palm Kernel meal	5.00	5.00	5.00	5.00
Soya Meal	20.0	16.0	14.0	12.0
Groundnut Cake	10.0	10.0	10.0	10.0
Bone meal	1.5	1.5	1.5	1.5
Oyster shell	0.5	0.5	0.5	0.5
S/Premix	0.25	0.25	0.25	0.25
Salt	0.50	0.50	0.50	0.50
PCLSM	0	5.00	10.0	15.0
	100	100	100	100
Determined Analysis				
Crude Protein (%)	20.09	21.01	21.04	21.07
Crude Fibre (%)	4.10	4.10	4.10	4.10
Ether extract (%)	3.74	3.74	3.74	3.74

Ash (%)	2.6	2.6	2.6	2.6
Metabolizable energy (Kcal/kg)	2702.0	2706.0	2705.0	2705.1
Calcium (%)	3.00	3.00	3.00	3.00
Methionine (%)	0.45	0.45	0.45	0.45

*Vitamin –mineral premix contained: Vit A 8,000 IU; Vit D3, 2000 IU; Vit E, 11 IU; Vit B2, 10mg; Vit B3, 30mg; Vit B6, 20mg; Choline chloride, 400mg; Manganese, 120mg; Iron, 70mg; Copper, 10mg; Iodine,2.2mg; Selenium, 0.2mg; Zinc, 45mg; Cobalt,0.02mg.

Table 2. Proximate Composition of PLLM

Nutrients	% DM
Crude Protein	10.07 ± 0.20
Crude Fibre	17.74± 0.24
Ether extracts	0.20 ± 0.16
Ash	5.08 ± 1.12
Minerals (Mg/kg)	
Sodium	
Calcium	19.67± 0.15
Phosphorus	56.3± 1.05
Magnesium	14.14± 0.11
Potassium	16.33±0.05

Table 3. Proximate Composition of CSM

Nutrients	% DM
Crude Protein	12.99 ± 0.40
Crude Fibre	37.34 ± 0.16
Ether extracts	1.97 ± 0.08
Ash	5.51 ± 1.32
Minerals (Mg/kg)	
Calcium	17.0± 0.05
Phosphorus	1.3± 1.15

Magnesium	0.14± 0.11

Table 4: Phytochemistry of PLLM

Parameters	Quantity
Saponin (%)	0.15± 0.01
Tannin (%)	3.95± 0.17
Phenols (%)	0.40± 0.22
Alkaloids (%)	2.06± 0.04
Flavonoids (%)	60.8± 0.12
Phytate (mg/g)	10.22±1.01

Table 5: Photochemistry of CSM

Parameters	Quantity
Steroids (%)	15.0± 0.24
Tannin (%)	9.95± 0.10
Phenols (%)	10.09± 0.72
Alkaloids (%)	12.06± 0.02
Flavonoids (%)	30.80± 0.11

Table 6: Growth Performance of Japanese quails fed PCLSM

	Diets				
Parameters	1	2	3	4	S/L
Number of quails	45	45	45	45	
Initial body weight (g)	18.11 ± 0.07	18.05 ± 0.11	18.16 ± 0.22	18.03± 0.15	NS
Final body weight (g	159.1 ± 0.12^c	190.5± 0.10^b	198.1± 0.51^b	199.1± 1.22^a	**
Daily feed intake (g)	610.1 ± 2.11^a	540.4 ± 1.80^{ab}	533.1 ± 1.23^b	532.7± 1.45^c	**
Daily weight gain (g)	140.9± 0.83^c	522.3 ± 1.40^b	514.9 ± 1.61^{ab}	514.7± 1.34^a	**
FCR	3.83 ± 0.08^c	2.84± 0.07^b	2.69 ± 0.12^a	2.68± 0.14^a	**
Daily W.C (ml)	810.1±0.18^c	800.3±0.21^{ab}	798.9±0.17^c	820.1±0.43^a	**

Mortality	06	0	0	0	**

NS: No significant difference (P>0.05)

**: Significant difference (P<0.05)

FCR: Feed conversion ratio

W.C: Water consumption

abc: Means with different superscripts along the same row are significantly different(P<0.05)

Table 7: Effect of feeding different levels of PCLSM on haematological parameters of Japanese quails

Parameters	Diets				
	1	2	3	4	S/L
Pack cell volume (%)	39.07±0.13^{c}	48.11± 0.16^{c}	50.08± 0.11^{ab}	50.10±0.15^{a}	**
Haemoglobin (g/dl)	10.07±0.13^{c}	11.02± 0.16^{a}	11.08± 0.11^{b}	11.10±0.15^{c}	**
Red blood cell ($10^6 mm^3$)	2.06 ± 0.23^{c}	3.13 ± 0.29^{b}	3.14 ± 0.31^{a}	3.15 ± 0.77^{a}	**
White blood cell ($10^6 mm^3$)	123.7 ± 1.16^{a}	127.11± 1.10^{ab}	124.1± 1.25^{b}	127.9 ± 1.31^{c}	**
MCV (f/l)	108.11±3.31^{c}	121.9±4.01^{c}	131.2±2.14^{ab}	132.05±3.12^{a}	**
MCH (pg)	26.44±2.17^{c}	37.01±1.81^{c}	38.13±1.56^{b}	39.18±1.09^{a}	**
MCHC (%)	20.16±0.21^{c}	33.14±0.33^{b}	33.09±1.25^{c}	33.45±1.76^{a}	**
Neutrophils (%)	2.11±0.05	2.15±0.03	2.17± 0.06	2.13±0.04	NS
Monocytes (%)	0.00	0.00	0.00	0.00	-
Eosinophils (%)	0.00	0.00	0.00	0.00	-
Lymphocytes (%)	71.13±0.09c	91.18±0.12ab	91.21±0.13b	91.44±0.87a	**

NS: No significant difference (P>0.05)

**: Significant difference (P<0.05)

MCV: Mean corpuscular volume
MCH: Mean corpuscular haemaoglobin

MCHC: Mean corpuscular haemoglobin concentration

abc: Means with different superscripts along the same row are significantly different (P<0.05)

RESULTS AND DISCUSSION

Table 1 shows the gross composition of the experimental diets, the crude protein contents of the diets increased as the inclusion of PLCSM increases, it significantly (P<0.05) affected the final live weight of the quails. The crude protein and energy values obtained in the experimental diets fall within the range recommended by Murakami et al (1993), NRC (1994) and Hyankova et al (1997).

The Proximate composition of Polyalthia longifolia leaf meal (PLLM) is presented in Table 2. The results of the proximate analysis showed that the PLLM contained 10.01% crude protein, 19.70% crude fibre, 0.18% ether extract, 7.70% moisture, 6.02% ash, 20.12mg sodium, 58.11mg calcium and 13.76mg magnesium. The data obtained based on the chemical composition of PLLM are similar to the findings of Ojewuyiet al (2014) on the proximate composition of mature P. longifolia leaves.

Table 3 reveals the proximate composition of CSM. The proximate components of CSM used in this study are 12.99%, 37.34%, 1.97%, 5.51%, 17.0%, 1.3% and 0.14% for crude protein, crude fibre, ether extract, ash, calcium, phosphorus and magnesium respectively. However all the values fall within the range reported by Rosli et al (2011) on the effect of corn silk on the sensory properties of chicken patties.

Table 4 shows the photochemistry of PLLM, the values obtained for tannin and phenols are 3.84 and 0.42 (ppm) respectively while those of flavonoids, alkaloids, steroids and saponin are 59.1%, 0.51%, 1.19% and 1.31% respectively. The value obtained agrees with the findings of Anupam Ghosh et al (2008); Mundhe Kavita S (2012) and Ojewuyi et al (2014). The phytochemical analysis of CSM is expressed in Table 5, the values obtained for steroids, tannin, phenols, alkaloids and flavonoids are 15.0%, 9.95%, 10.09%, 12.06% and 30.80% respectively this result is in line with the findings of Bhuvaneshwari et al (2015) on the analysis of nutrients and phytochemical components in corn silk (Zea mays). According to Adisa et al (2010) and Chinwe et al (2015) tannins are known to possess anti-bacterial, anti-inflammatory, anti-parasitic, anti-cancer, anti-viral and anti-oxidant activity, saponin plays a significant role in maintaining blood cholesterol levels (Cheeke, 2000) and phenol is an erythrocyte membrane modifier (Adesanya and Sofowora, 1983).

The performance of quails showing the feed intake, body weight, water intake, feed conversion ratio (FCR) and mortality is presented in Table 6. There was a significant difference (P<0.05) among treatment in terms of their final live weight. The total feed intake values obtained are 159.1, 190.5, 198.1 and 199.1 (g) for diets 1, 2, 3 and 4 respectively while those of daily feed intake (g) are 610.1, 540.4, 533.1 and 532.7 for diets 1, 2, 3 and 4 respectively. The daily weight gain values are 140.9g, 522.3g, 514.9g and 519.7g for diets 1, 2, 3 and 4 respectively while those of feed conversion ratio are 3.83, 2.84, 2.69 and 2.68 respectively. The daily water intake values obtained are 810.1, 800.3, 798.9 and 820.1 (ml) for 1, 2, 3 and 4 respectively.

The final weight, feed intake, feed conversion ratio and mortality were significantly affected (P<0.05) by the dietary inclusion of PLCSM. This is a clear indication that the inclusion of PLCSM across the treatment can support the growth of the quails, birds fed diet 4 had a better final weightfollowed by diet 3, 2 and 1 respectively. This could be due to a higher protein content contained in the experimental diet. This agrees with the findings of Odetola et al (2012) and Olatunji et al (2016) when Moringa leaf meals were fed to weaner rabbits but contrary to the reports of Savas Sariözkan (2018) when lemon grass was supplemented in the diets of quails. Preston and Leng (1987) reported that the growth rate of an animal is determined by the feed intake and digestibility, with feed intake being determined by balance of nutrients especially

protein in relation to energy for metabolism. Quails fed diet 1 had a high mortality of six (6), however none was recorded in diet 2, 3 and 4 respectively, this could be as a results of the phytochemicals in the test materials (PLCSM). Pharmacological studies on the bark and leaves of the plants shows display effective antimicrobial activity (Faizi et al, 2003), cytotoxic function (Chang et al, 2006; Chen et al, 2006), hypotensive effects (Saleem et al, 2005).
The haematological parameters as influenced by the diets are presented in Table 7. The pack cell volume (PCV) values obtained are 39.07, 48.11, 50.08 and 50.10 (%) for 1, 2, 3 and 4 respectively while those of haemoglobin (Hb) are 10.07, 11.02, 11.08 and 11.10 (g/dl) for 1, 2, 3 and 4 respectively. The red blood cell (RBC) values obtained are 2.06, 3.13, 3.14 and 3.15 (106mm3) for 1, 2, 3 and 4 respectively while those of white blood cell are 123.7, 127.11, 124.1 and 127.9(106mm3) for 1, 2, 3 and 4 respectively. The MCV values obtained are 108.11, 121.9, 131.2 and 132.05 (f/l) for 1, 2, 3 and 4 respectively while those of MCH are 26.44, 37.01, 38.13 and 39.18 (pg) for 1, 2, 3 and 4 respectively. The PCV, Hb, RBC, MCV, MCH and MCHC were significantly ($P<0.05$) by the dietary inclusion of PLCSM. The values obtained for all the parameters fall within the range established by Puspamitra et al (2014) for Japanese quails. The haematological results in this experiment is also in agreement with the reports of Obikaonu et al (2014) but contrary to the findings of Olabanji et al (2007) and Alagbe, J.O (2016) on the effects of P. lonifolia leaf meal on the blood profile of broilers.The results obtained for heamatological analysis is a clear indication that PLCSM inclusion in the diets did not affect the formation of blood cells and their constituents; it is also a pointer to nutritional adequacy and safety of the test material (PLCSM).
According to Abdi-Hachesoo(2013), the physiological, nutritional and pathological conditions of animals are usually assessed using heamatological analysis of their blood. Haematological components, which consists of red blood cell (RBC), white blood cell (WBC), MCH, MCV, MCHC are valuable in monitoring feed toxicity especially feed constituents' that affect the blood as well as health status of animals (Oyawoye and Ogunkunle, 2004). Isaac et al (2013) reported that RBC are involved in the transportation of oxygen, pack cell volume (PCV) are involved in the transport of absorbed nutrients (Soetan et al, 2013). WBC plays a vital role in antibody formation to prevent the animals against diseases (Iwuji and Herbert, 2012).

CONCLUSION

The P. longifolia - Corn silk meal mixture (PLCSM) at 15% inclusion did not have any deleterious effect on the health, blood profile and general performance of quails.

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